nitrate on it, into an electric furnace at 350 °C. This temperature was below the strain point of the cover glass and above the melting point of potassium nitrate. On the morning of February 10, I observed that the glass cover slip was rather strongly concave down due to compression resulting from replacement of sodium ions with potassium ions. Similar experiments were performed February 10 and similar results were observed that day and on February 11.

Repeated reductions to practice were accomplished in a similar manner during the period March 3-8, 1960 (pages 15-24). The radius of curvature of several exchanged cover slips were determined graphically employing the calculations shown in the entries dated February 29, 1960 and March 2, 1960. The radius of curvature determination was based on interference ring distance measurements.

During the period March 17-19, 1960 (pages 37 and 38) I again reduced my invention to practice, and determined the radius of curvature and the compressive force (F_B) in the surface layer.

Drs. Christensen, Ryan and Baer were familiar with the details of my "Strength and Failure of Glass" project. They observed my equipment and the bottles of chemical reagents employed, my notebook and the diffraction or interference rings present in the treated cover slips during this period as set forth in their affidavits.

I diligently continued working on the project and prepared a patent disclosure entitled "Increasing Strength of Glass by Diffusing Large Ions into the Surface" (Exhibit 8). I also prepared a memorandum dated July 19, 1960 supplementing my disclosure (Exhibit 12). To the best of my knowledge and belief, my disclosure and memorandum were forwarded in July of 1960 to the Research Corporation by Dr. Christiansen, Coordinator of Cooperative Research at the University of Utah. I wrote a letter to Mr. Yates of Research Corporation discussing my work on August 5, 1960 (Exhibit 15), and letters to Mr. Stowell their patent attorney containing further data on September 19, 1960 (Exhibit 23) and informing him that no further data would be available in the immediate future on October 14, 1960 (Exhibit 25). The completed application was sent to me for execution by letter dated October 25, 1960 (Exhibit 26) and for notarization of my signature by letter dated November 3, 1960 (Exhibit 28). The application was filed in the Patent Office on November 15, 1960.

The relevant substance of each of the affidavits of Baer, Ryan and Christiansen consists of the following averments, made as of March 1966:

THAT he knows and has been associated professionally in the Department of Chemical Engineering of the University of Utah with Samuel S. Kistler, applicant in the above-identified application, and is familiar with Kistler's work on the strengthening of glass;

THAT in 1959 and 1960 Kistler performed his experiments on the strengthening of glass in a room frequented by various members of the Department of Chemical Engineering and that bottles of chemical reagents, the furnace, the microscope, and the notebook used by Kistler were readily apparent;

THAT on various occasions, sometime about January or February, 1960, he observed Kistler treating glass cover slips and that he viewed under the microscope glass cover slips curved by Kistler's treatment and observed circular diffraction rings in the curved glass slips.

Christiansen also averred:

THAT he is the E. B. Christiansen who signed Kistler's research proposals to the National Science Foundation and to the Owens-Illinois Technical Center dated March 26, 1958 and September 18, 1959, respectively.

The Christensen affidavit reads in part:

THAT since 1946 he has been associated with the University of Utah and that he knows Samuel S. Kistler, applicant in the above-identified application, and is familiar with Kistler's work in the strengthening of glass; and

THAT he is the Carl J. Christensen, Coordinator of Cooperative Research, who signed Kistler's research proposals to the National Science Foundation and to the Owens-Illinois Technical Center dated March 26, 1958 and September 18, 1959, respectively.

With respect to the adequacy of Kistler's affidavits and exhibits, the entirety of the board's opinion reads:

We agree with Weber's position that Kistler's showing is fatally inadequate, at least from the standpoint of corrobration and testing, as it does not appear from Kistler's own testimony that he subjected the product of his process to tests, or from the corroborating affidavits that his supporting witnesses had knowledge adequate to supply vitally necessary corroboration as to reduction to practice or diligence.

We agree with the board's conclusion. It is clear from the above quotations that none of the so-called corroborating witness affidavits makes any reference to even one of the process limitations of the count. As the appellee said to the board, "The probative significance of these averments is nil * * *." Nothing is left except the averments of the inventor himself and his own notebook. Examination of the notebook shows that it was kept by Kistler himself and is unwitnessed. The supporting witnesses said no more, in effect, than that they had seen the notebook in his laboratories, along with the equipment and bottles. They did not say they knew anything of its contents. Therefore, they have not corroborated anything it contains.

Consideration of Kistler's Supplemental Brief shows that his theory of this case is that he does not have to *prove* his facts at this stage of the interference but only give rise to an *inference* or show a *possibility* that he could prove them later, which he says should suffice to prevent summary judgment:

> * * * Appellant should be entitled to a trial on the merits. For now, it is sufficient that we can say when considering the purpose for which the affidavits were made, that there is a reasonable *possibility* that the corroborating affiants *possessed* the knowledge required. [Emphasis ours.]
>
> * * *
>
> Moreover, a determination of whether or not the corroborating affiants had acutal knowledge of the steps of the process or of testing is premature; such a determination bears only upon the weight to be given their subsequent testimony.

We cannot accept this procedural theory. To do so would entirely vitiate the purposes of Rules 204(c) and 228 and allow mere uncorroborated assertions to take the place of proof of acts and circumstances adequate to overcome Weber's March 9, 1960, filing date.

The decision of the board is *affirmed.*

Court of Customs and Patent Appeals

In re GARNERO

No. 8172 Decided June 26, 1969

PATENTS

1. Claims—Article defined by process of manufacture (§ 20.15)

Mere presence of method limitation in article claim which is otherwise allowable does not so poison claim as to render it unpatentable.—In re Garnero (CCPA) 162 USPQ 221.

2. Claims—"Comprising," "Consisting," etc. (§ 20.30)

"Consisting essentially of" terminology in claim excludes additional unspecified ingredients which would affect basic and novel characteristics of product defined in balance of claim.—In re Garnero (CCPA) 162 USPQ 221.

Particular patents—Structural Material

Garnero, Structural Material of Expanded Minerals and Method for Manufacture, claims 1 and 9 of application allowed.—In re Garnero (CCPA) 162 USPQ 221.

Appeal from Board of Appeals of the Patent Office.

Application for patent of Anthony L. Garnero, Serial No. 381,145, filed July 8, 1964; Patent Office Group 160. From decision rejecting claims 1 and 9, applicant appeals. Reversed.

See also 145 USPQ 457.

HERMAN HERSH and MCDOUGALL, HERSH, SCOTT & LADD, both of Chicago, Ill. (GEORGE A. DEGNAN, Washington, D. C., of counsel) for appellant.

JOSEPH SCHIMMEL (FRED W. SHERLING, of counsel) for Commissioner of Patents.

Before RICH, Acting Chief Judge, HOLTZOFF and MCLAUGHLIN, Judges, sitting by designation, and ALMOND and BALDWIN, Associate Judges.

BALDWIN, Judge.

This appeal is from the Patent Office Board of Appeals decision affirming the examiner's rejection of two claims[1] of appellant's application[2] as unpatentable

[1] The rejections of only claims 1 and 9 are pursued on appeal here.

[2] Serial No. 381,145, filed July 8, 1964, for "Structural Material of Expanded Minerals and Method for Manufacture," allegedly a continuation of application serial No. 714,831, filed February 12, 1958, for "Structural Material of Expanded Minerals and Method for Manufacturing." The parent application was before this

under 35 U.S.C. 103, claim 1 being rejected on Thomas [3] in view of Pierce [4] and claim 9 being rejected on the same combination of references further in view of Ford.[5] No claim has been allowed.

The Invention

The invention relates to a thermal insulation panel formed from expanded perlite particles. The particles are held together without any additional material, such as an external bonding agent, by interfusion between the surfaces of the perlite particles. Interfusion is effected by taking the initially unexpanded perlite particles and heating them rapidly for expansion so that combined water associated with the particles is released as a vapor which operates as a flux which enables the particles to become stuck together at temperatures as low as 1400 °F.[6] The specification describes the product as "having a density which may vary from 1 pound per cubic foot to as much as 80 pounds per cubic foot while still maintaining a porosity and a mass integrity sufficient to enable use thereof as a structural insulation material."

Claims 1 and 9 read:

1. A composite, porous, thermal insulation panel characterized by dimensional stability and structural strength consisting essentially of expanded perlite particles which are interbonded one to another by interfusion between the surfaces of the perlite particles while in a pyroplastic state to form a porous perlite panel.

9. An insulation panel as claimed in Claim 1 in which the panel is formed in cross-section with layers of different densities.

The References

Thomas discloses a pipe insulating composition which utilizes sodium silicate as a binding agent to hold already expanded perlite particles together, with sodium chloride being used as a setting agent. A mixture of the expanded perlite, the sodium silicate binder, and the sodium chloride setting agent are subjected to a compression from 5 to 7 tons per square foot, at ambient temperature, to produce articles formed of the composition. Prior to compression, Thomas' aggregate mixture has a density of 4 to 10 pounds per cubic foot.

Pierce discloses a building material utilizing expanded perlite particles which are mixed with hot hydrated lime (CaO) at a temperature of about 300° F. Pierce states that "the exterior of the granules reacts chemically to bind the entire mass together." The specification discloses that the end product may have a density of 40-50 pounds per cubic foot.

Ford discloses cellular glass pellets having a core of highly cellulated glass, an intermediate layer of less highly cellulated glass, and an outer layer of substantially uncellulated glass, thus demonstrating a panel having a cross-section of varying density.

The Rejection

Sustaining the examiner's rejection of claim 1 as being unpatentable over Thomas in view of Pierce under 35 U.S.C. 103, the board stated:

> The language used by Pierce is considered to be readable on "interbonding by interfusion" as expressed in the claims at issue. Albeit that the condition limitations appear to differ somewhat from the details of the process described by the patentees, we are apprised of no facts which would lead us to conclude that the instantly claimed product necessarily would be patentably unique when compared to that resulting from the prior art methods.

The board rejected arguments by appellant that the inclusion in the claim of the phrase "consisting essentially of" would exclude the presence of an external binder and thus distinguish from the composition of Thomas which uses a sodium silicate binder and that the phrase "expanded perlite particles which are interbonded one to another by interfusion between the surfaces" distinguishes from the chemical bonding of Pierce which employs lime as an additional ingredient. Instead the board noted the existence of other claims (now cancelled) adding other limitations to claim 1 and stated:

> [T]he recital of "consisting essentially" renders a claim open only for the inclusion of unspecified ingredients which would not materially affect the basic and novel characteristics of the product defined in the balance of the claim. * * * Where, as here, other claims indicate that particular components are not excluded by the words "consisting essentially of", appellant's arguments as to the existence of diverse reaction mechanisms in the prior art processes cannot be accepted as conclusive of a factual patentable distinction in his claimed product.

The examiner's rejection of claim 9 on the ground that the feature of different densities in different layers would be an obvious modification in view of Ford, was affirmed by the board in that:

> Appellant has urged no patentable merit in the specific modifications set forth in claims 5 through 9, and we perceive none.

Opinion

On appeal the solicitor's position appears to be that the only distinction between appellant's *product* and the *products* of the prior art is the *process* by which appellant's product is made; and, as that *process* has been found to be unpatentable in our previous decision of In re Garnero, 52 CCPA 1370, 345 F.2d 589, 145 USPQ 457 (1965), then the *product* claims are likewise unpatentable. The solicitor is in effect reading claim 1, which recites "expanded perlite particles which are interbonded one to another by interfusion between the surfaces of the perlite particles while in a pyroplastic state to form a porous perlite panel," as a product claim containing a process limitation and then applying the rationale expressed by this court in In re Stephens, 52 CCPA 1409, 345 F.2d 1020, 145 USPQ 656 (1965); and In re Dilnot, 49 CCPA 1015, 300 F.2d 945, 133 USPQ 289 (1962).

The trouble with the solicitor's approach is that it necessarily assumes that claim 1 should be construed as a product claim containing a process, rather than structural, limitation. However, it seems to us that the recitation of the particles as "interbonded one to another by interfusion between the surfaces of the perlite particles" is as capable of being construed as a structural limitation as "intermixed," "ground in place," "press fitted," "etched," and "welded," all of which at one time or another have been separately held capable of construction as structural, rather than process, limitations.[7] The correct inquiry therefore, it appears to us, is whether the product defined by claim 1 is patentably distinguishable over the disclosures of Thomas and Pierce in view of the *structural* limitation defining the panel as "consisting essentially of expanded perlite particles * * * interbonded one to another by interfusion between the surfaces of the perlite particles." [8] Neither Thomas nor Pierce disclose expanded perlite particles *interbonded one to another by interfusion between the surfaces thereof;* it is not therefore reasonable to view such interbonding to be obvious by considering the references collectively.

[2] Moreover, the "consisting essentially of * * *" terminology would, as the board pointed out, exclude additional unspecified ingredients which would affect the basic and novel characteristics of the product defined in the balance of the claim. However, to follow the teachings of Thomas combined in any manner with Pierce, would *require* the presence of at least one additional material with the expanded perlite, whether it be the sodium silicate binder of Thomas or the hydrated lime which Pierce uses to provide a chemical joining action. In either event it cannot be said that the additional ingredient would not materially affect the basic

court in In re Garnero, 52 CCPA 1370, 345 F.2d 589, 145 USPQ 457 (1965), and we there affirmed the rejection of claims directed to a method of manufacturing an expanded perlite structure as being obvious under 35 U.S.C. 103 in view of certain, different prior art cited in that case.

[3] U. S. Patent 2,600,812, issued June 17, 1952.

[4] U. S. Patent 2,517,235, issued August 1, 1950.

[5] U. S. Patent 2,691,248, issued October 12, 1954.

[6] Thus, appellant's specification states:

> Fusion believed to be necessary for adhesion occurs with the average perlite at a temperature within the range of 2000-2200° F. It has been found, however, that the combined water which is released as a vapor when the perlite particles are heated to a pyroplastic state operates as a flux which enables the desired stickiness to develop for agglomeration when the particles are heated to a temperature as low as 1400° F. but preferably at a temperature above 1600° F. Thus agglomeration can be achieved at a temperature starting at 1400° F. Best adhesions and expansions are secured when the particles are heated to a temperature above 1800° F. Thus the preferred conditions for operation from the standpoint of expansion and agglomeration will reside in heating the particles to a temperature of 1800-2200° F.

[7] Saxe and Levitt, Product by Process Claims and Their Current Status in Chemical Patent Office Practice, 42 JPOS 528, 536, 537 (August 1960), and cases collected thereat.

See also a recent decision of this court in In re Steppan, 55 CCPA 791, 394 F.2d 1013, 156 USPQ 143 (1967), in which we found that use of the term "condensation product" in a chemical claim to a product did not thereby render the claim a product-by-process claim.

[1] [8] Taking the view we do that the just recited limitation is structural in nature we do not find it necessary to consider the additional recitation "while in a pyroplastic state * * *" as the mere presence of a method limitation in an article claim which is otherwise allowable would not so poison the claim as to render it unpatentable. Ex parte Lindberg, 157 USPQ 606 (P.O. Bd. App. 1967).

and novel characteristic of appellant's product which is that the perlite particles are held together *without* any additional material.

The rejections of claims 1 and 9 are therefore *reversed*. As to claims 2 and 5-8, the other claims initially appealed but not pursued, the appeal is dismissed.

McLAUGHLIN, Judge, concurs in the result.

Court of Customs and Patent Appeals

In re JONES

No. 8099 Decided July 3, 1969

PATENTS

Particular patents—Polypropylene

Jones, Filled Polypropylene, claims 1 and 2 of application refused.—In re Jones (CCPA) 162 USPQ 224.

Appeal from Board of Appeals of the Patent Office.

Application for patent of Roger F. Jones, Serial No. 123,096, filed July 11, 1961; Patent Office Group 140. From decision rejecting claims 1 and 2, applicant appeals. Affirmed.

ROGER V. N. POWELSON and DONALD R. JOHNSON, both of Philadelphia, Pa., for appellant.

JOSEPH SCHIMMEL (JOSEPH F. NAKAMURA of counsel) for Commissioner of Patents.

Before WORLEY, Chief Judge, and RICH, ALMOND, and BALDWIN, Associate Judges.

BALDWIN, Judge.

Jones appeals from the Patent Office Board of Appeals decision affirming the examiner's rejection of claims 1 and 2, the only remaining claims in his application,[1] as unpatentable over Ward,[2] Blake,[3] and Orzechowski,[4] taken in combination, under 35 U.S.C. 103.[5]

[1] Serial No. 123,096, filed July 11, 1961, for "Filled Polypropylene."

[2] U. S. Patent 2,835,107, issued May 20, 1958.

[3] U. S. Patent 2,993,799, issued July 25, 1961, on an application filed August 20, 1957.

[4] U. S. patent 3,166,542, issued January 19, 1965, on an application filed February 3, 1961.

[5] In his brief, appellant has urged that "[i]n the latter part of its opinion the Board of Appeals is apparently rejecting the claims as not being supported by sufficient disclosure." We do not consider that the board was postulating a new ground of rejection under Rule 196(b) but rather was only commenting on the adequacy of the showing of unexpected results.

The Invention

The invention relates to blends containing polypropylene and anthophyllite asbestos.[6] The specification indicates that articles molded from asbestos-filled polypropylene generally "exhibit enhanced tensile and flexural modulus"; however, under certain circumstances, specifically where the articles are to sustain prolonged exposure to moderately high heat,[7] the asbestos-filled compositions tend to oxidize and degrade more rapidly than unfilled polypropylene. Appellant has discovered that *anthophyllite* asbestos accelerates the oxidative degradation to a far lesser extent than do other asbestos.

The appealed claims read:

1. As a new composition of matter, a blend of crystalline polypropylene and anthophyllite asbestos, wherein the weight percent of asbestos is from 10% to 85%, together with a small but effective amount of an inhibitor against thermal and oxidative degradation.

2. The composition according to Claim 1 in which the weight percent asbestos is from 30% to 60%.

The References

Ward discloses compositions of asbestos with thermosetting resins, a number of which are listed as being applicable, and all types of asbestos are disclosed as acceptable. The preferred composition, however, comprises phenol-formaldehyde condensation resin with *anthophyllite* asbestos which has been chemically treated to eliminate acid soluble metallic constituents. The compositions

[6] Asbestos is the generic name given to a group of naturally-occurring, fibrous magnesium silicate minerals. There are two basic types: serpentine or long-fiber asbestos (chrysotile) and amphibole or short-fiber asbestos (tremolite, actinolite, amosite, crocidolite and anthopyllite). The latter type combine various amounts of iron, calium and sodium silicates with the magnesium silicate. They are said to be generally brittle and cannot be spun, as can chrysotile, but are more resistant to chemicals and heat. Condensed Chemical Dictionary 113 (6th ed. 1961).

[7] 280° and 310° F. are the only two temperatures mentioned in the specification. The intended use for the compositions may be "under the hood of an automobile in distributor caps, for example."

are intended for use in extremely high temperature situations such as are encountered by rockets.[8] The compositions may be molded for use as an insulating liner or as part of the structure of the rocket tube itself.

Blake discloses lightweight, fireproof construction materials consisting of asbestos, another filler (which is inert) and a plasticizer mixed with a resinous plastic, which may be either thermosetting or thermoplastic. The asbestos comprises "about 15%" of the mixture, is not defined more specifically, but is said to give "to the product its character," one element of which is increased tensile strength. Polyethylene was specifically tested as one component of the mixture.

Orzechowski is directed to a process for producing highly crystalline polyolefins, among which are polyethylene and *polypropylene*. The patent discloses that the crystalline polymers so produced "can be subjected to such aftertreatment as may be desired to fit them for particular uses or to impart desired properties," for example, the incorporation of antioxidants, stabilizers, plasticizers, pigments, and fillers, such as the silicas.

In addition to the references employed in the rejection, the record includes page 113 of the Condensed Chemical Dictionary,[9] originally cited by the examiner but discarded prior to his final action, and page 136 of the Kirk-Othmer Encyclopedia of Chemical Technology,[10] originally called to the examiner's attention by appellant and relied on in his brief here as support for certain arguments.

The Rejection

The board viewed the examiner's position as follows:

> * * * [S]ince the anthophyllite type has been used as the preferred form of asbestos to fill thermosetting resins for high temperature applications, such as rocket liners, as shown by Ward, and since asbestos generally has been used to fill both thermosetting and thermoplastic resins for a variety of uses, including insulation, it would have been obvious under 35 U.S.C. 103 to use the anthophyllite variety of asbestos as the filler in the thermoplastic resins, such as the well-known filled crystalline polypropylene as shown by Orzechowski. The latter is also relied upon to show the use of antioxidants and stabilizers broadly, as claimed, in the resin.

The Blake patent was not mentioned in this statement, but since that patent was relied upon by the examiner to show that it was known to employ asbestos as a filler with thermoplastic or thermosetting resins to produce materials having improved tensile strength, we presume that it was also relied upon by the board.

The board apparently considered that the combined references did present a prima facie case of obviousness, since the examiner's position was sustained without going into the disclosures of the references in detail. The thrust of the opinion was clearly aimed at evaluating the adequacy of the showing of unobvious results. The board determined first that the showing in the specification of improved tensile and flexural modulus was insufficient since there was no comparison of the effects of the different types of asbestos.[11] Appellant's use of the term "catalyze" to describe the effect of the asbestos in increasing the rate of degradation was then seized upon and combined with Ward's disclosure that he treated the anthophyllite to remove acid soluble constituents, to justify the conclusion that "some sort of chemical interaction between the asbestos and polypropylene" occurs. Using this conclusion, the board then determined that the showing in Table II of the specification, which did compare the different types of asbestos as to their effect on the rate of heat degradation in blends with polypropylene, was insuf-

[8] Part of the difficulty with this case arises from the examiner's use of Ward to show that anthophyllite asbestos has been preferred before in "heat resistant" applications. The "heat resistance" contemplated by Ward refers to the ability to withstand extremely high temperatures (in the order of 4000° F.) but only for short periods of time, while appellant's use of the term comprehends continuous exposure to heat at only moderate levels but for considerably extended periods of time. Considered to this respect, Ward does not suggest appellant's "heat resistance." We feel, however, that the reference remains pertinent as an indication that the art is aware of the varying properties of the different forms of asbestos from which the determination of the preferred form may be obvious. This position is fortified by the disclosures of two additional publications also included in the record.

[9] New York, Reinhold (6th ed. 1961).

[10] New York, Interscience (Vol. 2, 1948).

[11] Table I on page 4 of appellant's specification is a comparison of the structural properties of anthophyllite asbestos filled polypropylene with unfilled polypropylene. It contains no comparative showing as to other types of asbestos. Appellant states in his brief, however, that this table was placed in the specification only to show utility and "no claim was ever made in the prosecution of the case that the improvement in tensile and flexural modulus was in any way unexpected."